

Energy Codes for Buildings in Saskatchewan

saskatchewan.ca

Saskatchewan! 

Energy Management Task Force

May 3, 2023

Saskatoon, Saskatchewan

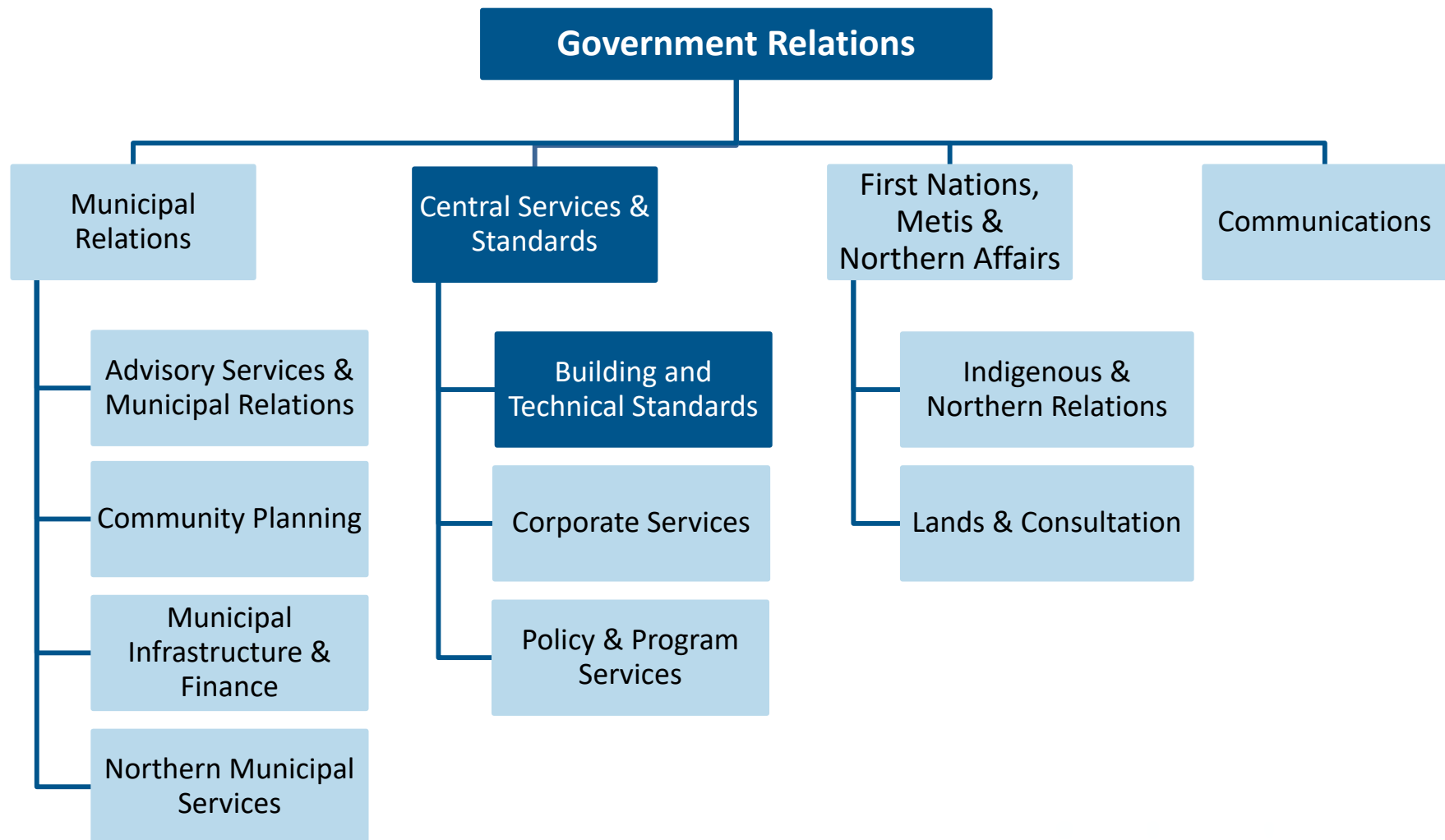
**Building and Technical Standards Branch
Saskatchewan Ministry of Government Relations**

Presented by: Ty Tweidt, Building Standards Engineer

Agenda

- Building and Technical Standards
- National Model Codes
- Legislation and Energy Codes for Buildings
 - Current Legislation
 - Proposed Legislation
- Comparison of Compliance Path Options
- Energy Code Tiers
- Proposed Buildings vs. Reference Buildings
- NECB Reference Building Comparisons
- NBC Reference Building Comparisons

Building and Technical Standards



Building and Technical Standards

- The Building and Technical Standards Branch (BTS) is responsible for developing, adopting and implementing construction codes, legislation, regulations and technical safety policy for Saskatchewan, and is the interface between Executive Government and the Technical Safety Authority of Saskatchewan (TSASK).
- BTS is responsible for *The Construction Codes Act* and the following regulations pursuant to this act:
 - *The Building Code Regulations*
 - *The Energy Code Regulations*
 - *The Plumbing Code Regulations*

National Model Codes

- As part of the Canadian Free Trade Agreement's Regulatory Reconciliation and Cooperation Table, the Government of Canada announced a new governance model for the National Model Code development system, effective November 22, 2022.
- It replaces the Canadian Commission on Building and Fire Codes, the committee responsible for code development in Canada since 1991.
- The new model integrates the provinces and territories into the national process to better respond to code priorities from jurisdictions and harmonize construction codes across Canada.



National Model Codes

- Saskatchewan participates in the National Model Code (NMC) development process at multiple levels:
 - Canadian Table for Harmonized Construction Codes Policy (i.e., Codes Policy Table)
 - Canadian Board for Harmonized Construction Codes (i.e., Codes Board).
 - Technical Committees
 - Sub Committees and Task Groups (i.e., Task Group on Operational Green House Gas Emissions – TG-OpGHGe)



National Model Codes

- Explicit building energy consumption limits applicable to new buildings are contained in two locations within the NMC:
 - The National Energy Code for Buildings (NECB)
 - Section 9.36 of the National Building Code of Canada (NBC)
- Explicit building energy consumption limits applicable to existing buildings do not yet exist in the NMC.



National Model Codes

- The 'Alterations to Existing Buildings' provisions are presently being developed by two task groups:
 - Alteration to Existing Buildings – NECB
 - Alteration to Existing Buildings – Section 9.36. of the NBC
- Once 'Alterations to Existing Buildings' provisions are published in the NMC, Saskatchewan will assess, review and consult on the provisions.



National Model Codes

- Currently, the NMC work towards decarbonization through implicit means, rather than explicit means, via reductions in building energy consumption.
- Explicit 'Operational Carbon' requirements will likely be published as part of either the NMC 2025 or the NMC 2030.
- Explicit 'Embodied Carbon' requirements will likely be published as part of either the NMC 2030 or the NMC 2035.

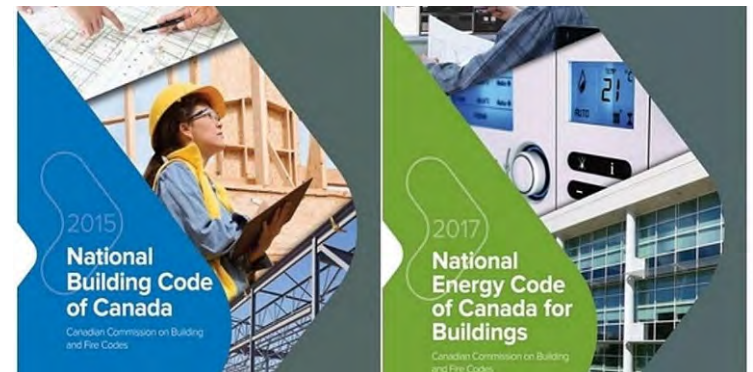


Legislation and Energy Codes for Buildings

- Regulation of building construction is the responsibility of each province and territory in Canada.
- *The Construction Codes Act, The Building Code Regulations, and The Energy Code Regulations* are the mechanisms by which Saskatchewan adopts, amends, and implements the NMC – except the National Fire Code – throughout the province.
- Local authorities (i.e., municipalities) adopt building bylaws in order to carry out their administration and enforcement duties, issue building permits and collect building permit fees within their municipalities.
- Saskatchewan’s legislation allows local authorities to adopt higher energy code standards (i.e., higher than those legislated by the province) through their building bylaw adoption process.

Current Legislation

- Under *The Energy Code Regulations*:
 - The National Energy Code of Canada for Buildings (NECB) 2017 is in-force and applies to buildings constructed on or after January 1, 2019.
- Under *The Building Code Regulations*:
 - Section 9.36. of the National Building Code of Canada (NBC) 2015 is in-force and applies to buildings constructed on or after January 1, 2019.
- Both the NECB 2017, and Section 9.36. in the NBC 2015, have three compliance path options in terms of building energy consumption:
 - Prescriptive Path.
 - Trade-Off Path.
 - Performance Path.



Proposed Legislation

- Under the proposed amendments to *The Energy Code Regulations*:
 - The NECB 2020 will be in-force on January 1, 2024, and will apply to buildings constructed on or after January 1, 2019.
- Under the proposed amendments to *The Building Code Regulations*:
 - Section 9.36. of the NBC 2020 will be in-force on January 1, 2024, and will apply to buildings constructed on or after January 1, 2019.
- Proposed changes to compliance path options will affect both the NECB 2020, and Section 9.36 of the NBC 2020:
 - NECB 2020: Tiered Performance Path Only.
 - NBC 2020: Either
 - Tiered Prescriptive Path, or
 - Tiered Performance Path.
- Proposed single climate zone (i.e., Zone 7A).



Comparison of Compliance Path Options

- The NECB 2017, and Section 9.36. in the NBC 2015:
 - Prescriptive Path.
 - Trade-Off Path.
 - Performance Path.
- The NECB 2020, and Section 9.36. in the NBC 2020:
 - Proposed to start on January 1, 2024:
 - NECB 2020: Tier 1 Performance Path.
 - NBC 2020: Tier 2 Prescriptive Path or Tier 2 Performance Path.
 - Proposed to start on January 1, 2025:
 - NECB 2020: Continue with Tier 1 Performance Path.
 - NBC 2020: Move to Tier 3 Performance Path.

Energy Code Tiers

- What are Energy Code Tiers?
- NECB 2020, Part 10, “Tiered Building Energy Performance Compliance”.

Table 10.1.2.1.
Energy Performance Tiers
Forming Part of Sentences 10.1.2.1.(1) and (2)

Energy Performance Tier	Percent <i>Building Energy Target</i> ⁽¹⁾	Percent Improvement ⁽¹⁾
1	≤ 100%	≥ 0%
2	≤ 75%	≥ 25%
3	≤ 50%	≥ 50%
4	≤ 40%	≥ 60%

Notes to Table 10.1.2.1.:

⁽¹⁾ See Sentence (2).

Energy Code Tiers

- What are Energy Code Tiers?
- NBC 2020, Subsection 9.36.7., “Tiered Energy Performance Compliance: Performance Path”.

Table 9.36.7.2.
Energy Performance Tiers for Buildings and Houses
 Forming Part of Sentence 9.36.7.2.(1)

Total Volume of Conditioned Space Within the Building or House	Energy Performance Metrics	Target Energy Performance				
		Applicable Energy Performance Tier				
		1	2	3	4	5
> 300 m ³ and where volume is not determined	Percent heat loss reduction ⁽¹⁾	n/a	≥ 5%	≥ 10%	≥ 20%	≥ 40%
	Percent improvement ⁽²⁾	≥ 0%	≥ 10%	≥ 20%	≥ 40%	≥ 70%
	OR Percent house energy target ⁽³⁾	≤ 100%	≤ 90%	≤ 80%	≤ 60%	≤ 30%
≤ 300 m ³	Percent heat loss reduction ⁽¹⁾	n/a	≥ 0%	≥ 5%	≥ 15%	≥ 25%
	Percent improvement ⁽²⁾	≥ 0%	≥ 0%	≥ 10%	≥ 30%	≥ 60%
	OR Percent house energy target ⁽³⁾	≤ 100%	≤ 100%	≤ 90%	≤ 70%	≤ 40%

Energy Code Tiers

- What are Energy Code Tiers?
- NBC 2020, Subsection 9.36.8., “Tiered Energy Performance Compliance: Prescriptive Path”.

Table 9.36.8.2.
Energy Performance Tiers
Forming Part of Clause 9.36.8.2.(1)(a)

Energy Performance Tier	Minimum Sum of Energy Conservation Points
1	(1)
2	10
3	Reserved
4	Reserved
5	Reserved

Proposed Building vs. Reference Building

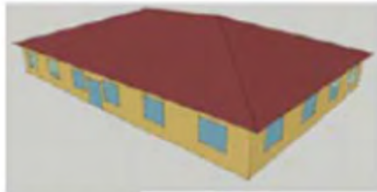
- The NECB & NBC make use of terms that are key to understanding concepts of how the tiered energy code requirements are applied:
 - Annual energy consumption means the annual sum of the lighting, service water heating and space-conditioning energy consumption of the proposed building.
 - Building energy target means the annual energy consumption of a hypothetical replica of the proposed building (i.e., reference building), using the same energy sources for the same functions and having the same environmental requirements, occupancy, climatic data and operation schedules as the proposed building, but made to comply with all applicable prescriptive requirements of this Code.

NECB Reference Building Comparisons

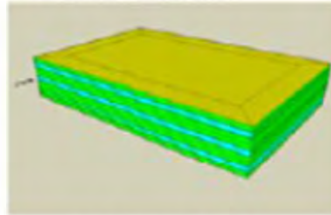
- Modelling simulations for eight building archetypes were conducted by NRC Research. Results appear to show that increases in energy performance are expected between the NECB 2017 and the NECB 2020 when looking at reference buildings for various archetypes located in Regina, Saskatoon and Prince Albert:
 - For electrical-heated scenarios, simulations show a 1 to 38% improvement in energy performance from the NECB 2017 to the NECB 2020, with an average of 13%. Further, all three locations show similar improvement with no location showing a greater relative improvement.
 - For gas-heated scenarios, simulations show a 4 to 72% improvement in energy performance from the NECB 2017 to the NECB 2020, with an average of 27%. Further, a greater relative improvement in Prince Albert than either Regina or Saskatoon is noticeable due to Zone 7B climate value utilization.
 - Matched infiltration assumptions were used in the modelling to provide an apples-to-apples comparison.

NECB Reference Building Comparisons

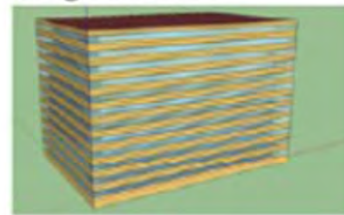
Small Office



Medium Office



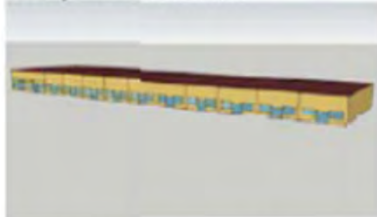
Large Office



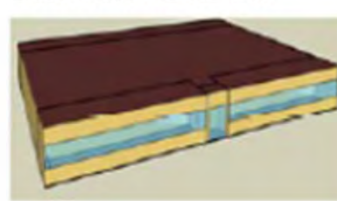
Warehouse



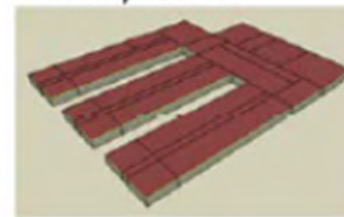
Strip Mall Retail



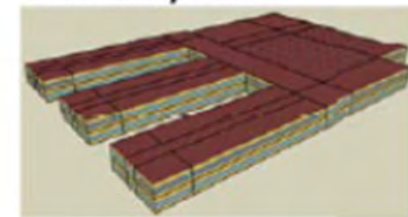
Standalone Retail



Primary School



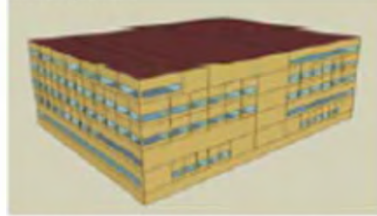
Secondary School



Outpatient Healthcare



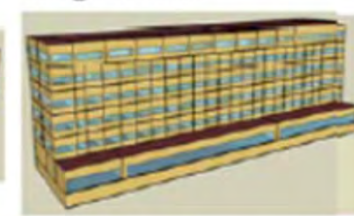
Hospital



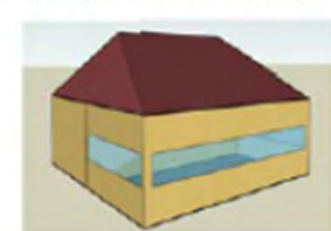
Small Hotel



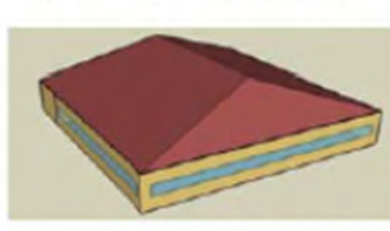
Large Hotel



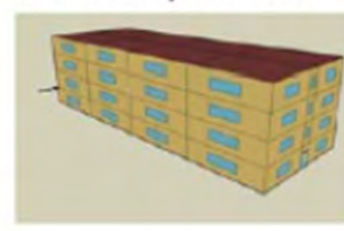
Quick-service Restaurant



Full-service Restaurant



Mid-rise Apartment



High-rise Apartment

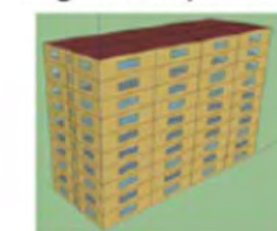


Figure 4.1. 3D Rendering of Prototype Building Models

NECB Reference Building Comparisons

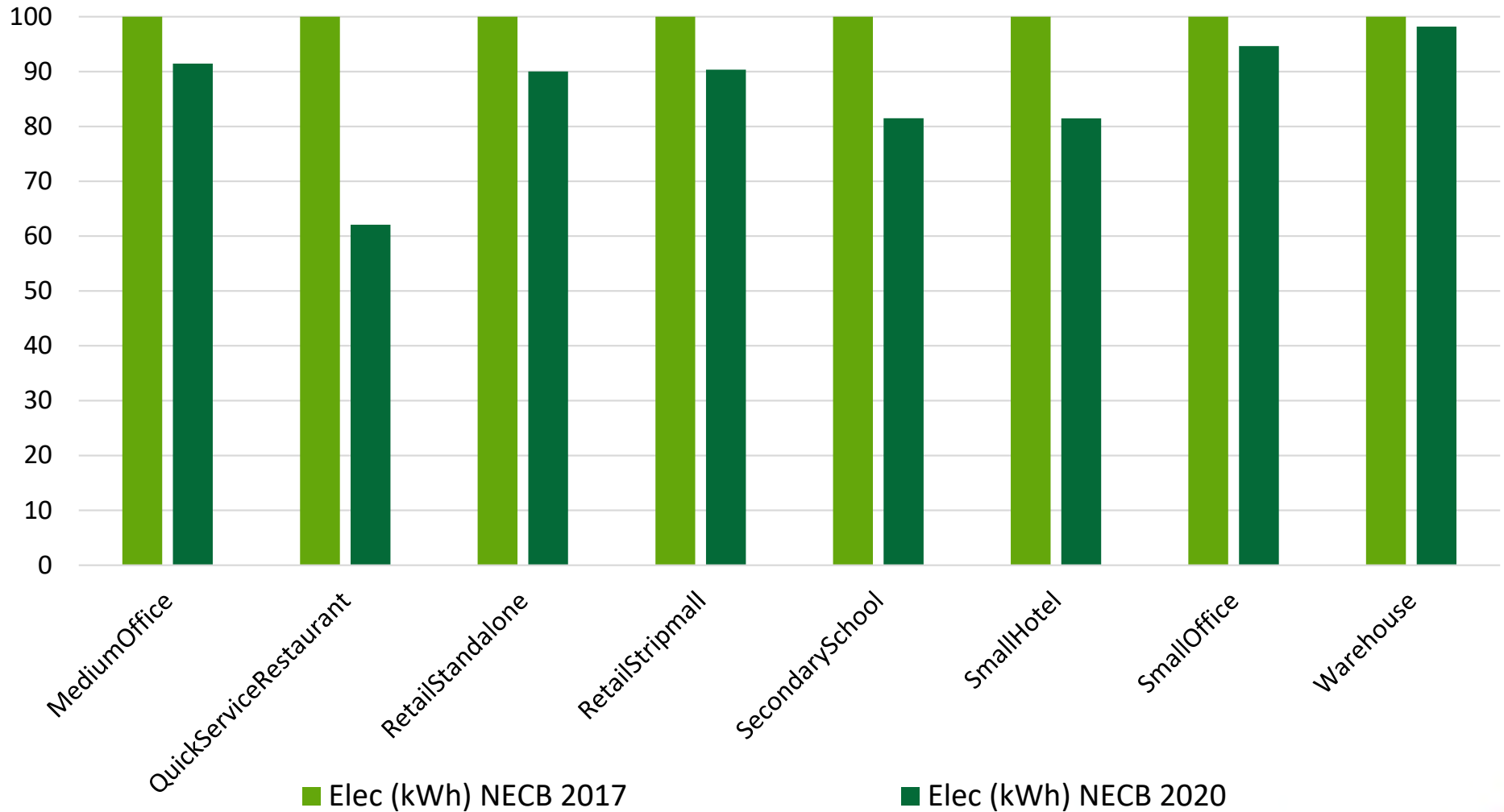
- Modelling simulation energy consumption output for eight building archetypes, as conducted by NRC Research.

Archetype	Location	Code version	Elec (kWh)	Gas (kWh)	EUI (kWh/m2)	Code version	Elec (kWh)	Gas (kWh)	EUI (kWh/m2)	% impr. Elec	% impr. Gas	% impr. EUI	Avg Elec %	Avg Gas %
MediumOffice	Prince.Albert	NECB2017	364900	256800	124.8	NECB2020	338100	165100	101	7.34	35.71	19.07	Prince.Albert	
QuickServiceRestaurant	Prince.Albert	NECB2017	48510	165800	922.6	NECB2020	30080	46340	328.9	37.99	72.05	64.35		
RetailStandalone	Prince.Albert	NECB2017	207400	218700	185.7	NECB2020	186700	162600	152.3	9.98	25.65	17.99		
RetailStripmall	Prince.Albert	NECB2017	198900	260500	219.8	NECB2020	178600	205100	183.6	10.21	21.27	16.47		
SecondarySchool	Prince.Albert	NECB2017	1601000	4007000	286.2	NECB2020	1295000	2318000	184.4	19.11	42.15	35.57		
SmallHotel	Prince.Albert	NECB2017	239500	580100	204.2	NECB2020	191300	481300	167.6	20.13	17.03	17.92		
SmallOffice	Prince.Albert	NECB2017	44520	24090	134.2	NECB2020	42340	16990	116.1	4.90	29.47	13.49		
Warehouse	Prince.Albert	NECB2017	168700	299700	96.88	NECB2020	166900	268800	90.13	1.07	10.31	6.97	13.84	31.71
MediumOffice	Regina	NECB2017	373500	249000	124.9	NECB2020	341600	196400	108	8.54	21.12	13.53	Regina	
QuickServiceRestaurant	Regina	NECB2017	49500	147900	849.6	NECB2020	30730	42830	316.6	37.92	71.04	62.74		
RetailStandalone	Regina	NECB2017	211700	212900	185.1	NECB2020	190600	172700	158.3	9.97	18.88	14.48		
RetailStripmall	Regina	NECB2017	206200	273100	229.3	NECB2020	186300	229100	198.7	9.65	16.11	13.34		
SecondarySchool	Regina	NECB2017	1637000	3659000	270.3	NECB2020	1334000	2230000	181.9	18.51	39.05	32.70		
SmallHotel	Regina	NECB2017	255700	559900	203.2	NECB2020	208300	484000	172.5	18.54	13.56	15.11		
SmallOffice	Regina	NECB2017	45670	22140	132.7	NECB2020	43230	17670	119.1	5.34	20.19	10.25		
Warehouse	Regina	NECB2017	182100	370500	114.3	NECB2020	178800	352300	109.8	1.81	4.91	3.94	13.78	25.61
MediumOffice	Saskatoon	NECB2017	374200	246100	124.5	NECB2020	342100	195500	107.9	8.58	20.56	13.33	Saskatoon	
QuickServiceRestaurant	Saskatoon	NECB2017	49460	147200	846.6	NECB2020	30640	42570	315.1	38.05	71.08	62.78		
RetailStandalone	Saskatoon	NECB2017	212100	202900	180.9	NECB2020	189800	162900	153.7	10.51	19.71	15.04		
RetailStripmall	Saskatoon	NECB2017	205500	254600	220.1	NECB2020	187000	210800	190.3	9.00	17.20	13.54		
SecondarySchool	Saskatoon	NECB2017	1645000	3646000	270.1	NECB2020	1330000	2213000	180.8	19.15	39.30	33.06		
SmallHotel	Saskatoon	NECB2017	254700	546100	199.5	NECB2020	207400	470600	168.9	18.57	13.83	15.34		
SmallOffice	Saskatoon	NECB2017	45550	22150	132.4	NECB2020	43090	17490	118.5	5.40	21.04	10.50		
Warehouse	Saskatoon	NECB2017	182900	324600	105	NECB2020	179200	309200	101	2.02	4.74	3.81	13.91	25.93
										MIN	1.07	4.74	3.81	
										MAX	38.05	72.05	64.35	
										AVG	13.85	27.75	21.89	

Electrical Heating

NECB 2017 vs. NECB 2020 Comparison (Regina)

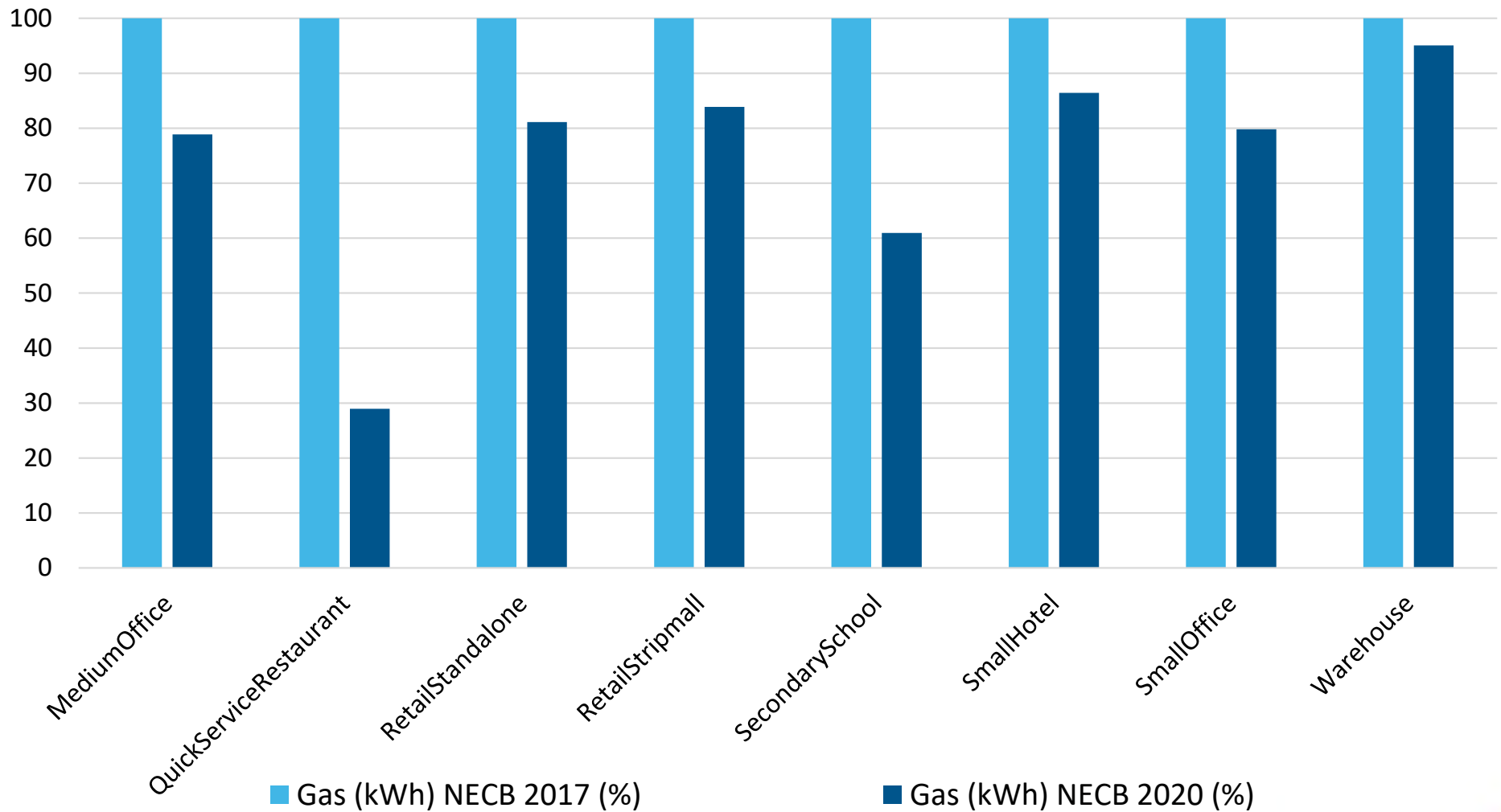
Reference Building Percentage Difference



Natural Gas Heating

NECB 2017 vs. NECB 2020 Comparison (Regina)

Reference Building Percentage Difference



NECB Reference Building Comparisons

- The eight archetypes used for the modeling data can be found at the following website, which contains the base information on the models used, including building type, floor area and storeys.
- <https://www.energy.gov/search/site?keywords=Archive+Reference+Buildings+By+Type>
- NECB rules were applied to these geometries and space types with Canadian climate zones, overwriting the corresponding US assumptions detailed on the www.energy.gov website.
- OpenStudio and EnergyPlus software were used for these simulations.

NBC Reference Building Comparisons

- Significant increases in energy performance are not expected between a reference building meeting Section 9.36. of the NBC 2015 and a reference building meeting Section 9.36. of the NBC 2020.
- There are, however, some small differences that have been introduced:
 - Minor changes to fenestration minimum U-values in Table 9.36.2.7.-A.
 - Gas-fired furnaces now require a minimum 95% AFUE with ECM (Table 9.36.3.10, 2015 code minimum 92% AFUE with no ECM requirement).
 - Minimum performance requirements for service hot water further broken down by first-hour rating.

Thank You and Questions

Building and Technical Standards Branch

Saskatchewan Ministry of Government Relations

1430 – 1855 Victoria Avenue

REGINA SK S4P 3T2

Phone: 306-787-4113

Fax: 306-798-4172

btstandards@gov.sk.ca

www.saskatchewan.ca/btstandards

Questions from the media are to be directed to:

Corey Rhiendel, Director, Communications

Ministry of Government Relations

Phone: 306-787-6156

Email: corey.rhiendel2@gov.sk.ca

THANK YOU

saskatchewan.ca